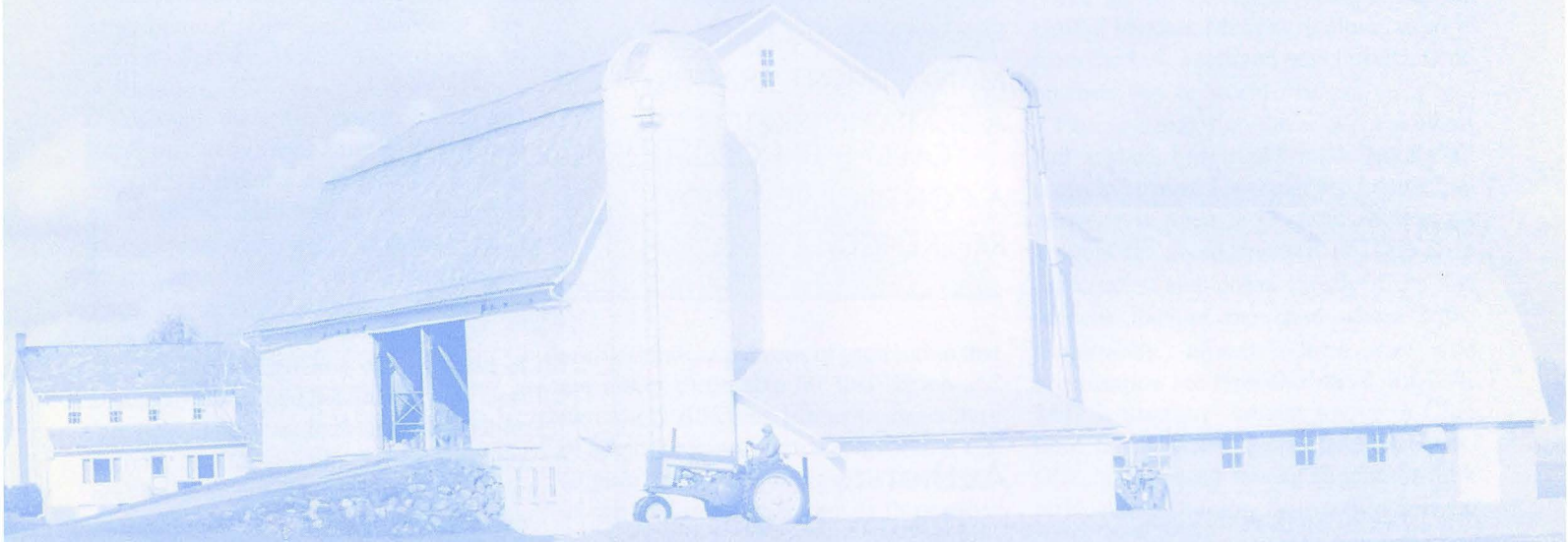
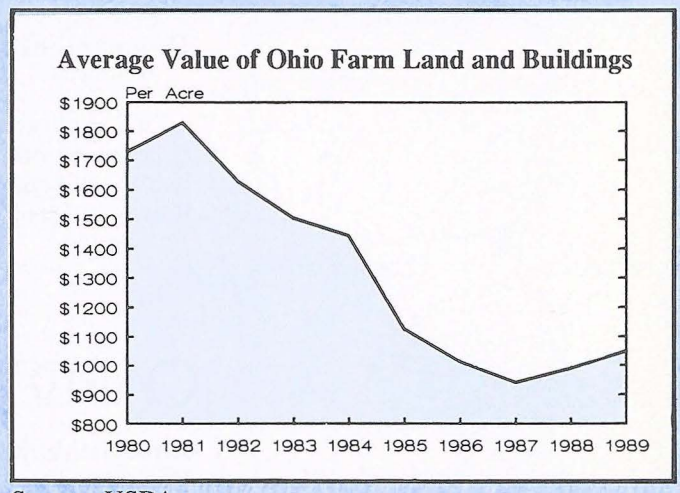
Research Bulletin 1185 December 1989

# Organization and Performance of Ohio Farm Operations in 1986






Source: USDA

The Ohio State University
Ohio Agricultural Research and Development Center
Wooster, Ohio

# Contents



**Authors:**

**Thomas T. Stout**
**D. Lynn Forster**
**Linda L. Lobao**
**Robert D. Muñoz**

**Department of Agricultural Economics and Rural Sociology**

This publication has benefitted from critical review and helpful suggestions by departmental colleagues Dale Adams, Bernard Erven, and Norman Rask, and from two anonymous reviewers at other institutions. The authors are grateful also to Pam Brown and Janice DiCarolis for preparation of text and graphics.

OARDC

**Kirklyn M. Kerr**
**Director**



12-89-1.5M

# ORGANIZATION AND PERFORMANCE OF OHIO FARM OPERATIONS IN 1986

## INTRODUCTION

### Background

This publication reports 1986 results of a longitudinal study that is making an annual survey of Ohio farm operator households for the years 1986-1990. The study was initiated in 1987 by the Department of Agricultural Economics and Rural Sociology at The Ohio State University, together with the Agriculture and Rural Development Division, Economic Research Service, U.S. Department of Agriculture.

Although the entire range of farm and nonfarm activities among household members is explored in this survey, its focal point is an examination of household management of the financial stress brought to agriculture in the 1980's by high interest rates, low commodity prices, and falling land values.

A clear understanding of the extent of financial stress and its impact on farm families is important in determining public policies toward agriculture. The financial health of farm families is of interest because farming is such an integral part of an interrelated set of industries, all of which are agricultural in nature, and all subject to scrutiny out of an abiding public concern over food and fiber welfare.

### The Food and Fiber Industry

What is called the food and fiber industry in some constructs of economic organization accounts for about 23 percent of total private employment in the U.S. economy, and somewhat over 20 percent of Gross National Product (Kohls). In 1981, according to the Governor's Commission on Agriculture, Ohio private employment was about 3.7 million (full time equivalent). Employment in the food and fiber industry in that year was distributed among production/marketing firms as indicated at the top of column two of this page.

| Activity | FTE's | Percent Ohio Labor |
|---|---|---|
| (1) Farm Supply (Sales) | 23,000 | 0.6 |
| (2) Farms (incl. forests and nurseries) | 43,000 | 1.2 |
| (3) Processing and handling | 135,000 | 3.6 |
| (4) Food Distribution (incl. hauling, storing, wholesaling, retailing) | 381,000 | 10.2 |
| (5) Indirectly Affected (incl. services, communications, etc.) | 185,000 | 5.0 |
| | | 20.6% |

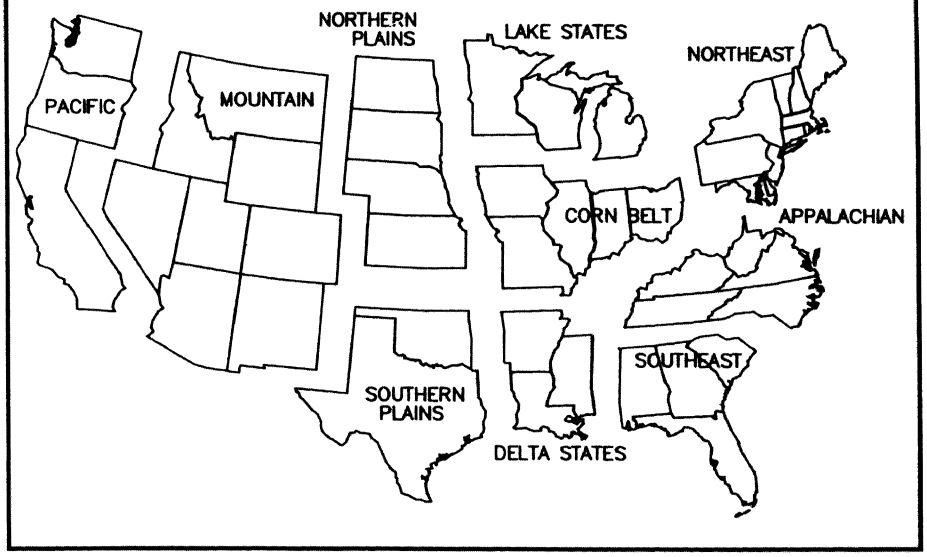
### Ohio Agriculture as an Example of Regional Agriculture

U.S. Department of Agriculture data are often presented on a regional basis in what USDA calls Farm Production Regions, each exhibiting patterns of production that are rather distinctive for that region and noticeably different from the agriculture of another region, even a neighboring one (Figure 1). Ohio is defined as being part of one region and adjacent to three other regions. Although Ohio is included among the Corn Belt states, and indeed the western portion of the state is distinctively Corn Belt, it also has agricultural areas that share much in common with both the Northeast and the Appalachian farm production regions.

Another special feature of Ohio agriculture is its proximity to U.S. and world markets due to its location and access to rail and water transportation to East Coast ports, the St. Lawrence Seaway, and the Gulf of Mexico. Many agricultural exports from the U.S. heartland pass through Ohio on their way to world markets.

Ohio is a major producer of corn, wheat and soybeans. It ranks sixth among all states in corn and soybean production and thirteenth in wheat production. These crops account for about one-half of Ohio farm marketings and come mostly from the western half of the state where soils, topography, climate, farm size and organization are typical of the Corn Belt. Milk is the third-ranking source of Ohio farm receipts behind corn and soybeans. Ohio ranks seventh among all states in milk production. Dairying will continue to be

**FIGURE 1: U.S. DEPARTMENT OF AGRICULTURE'S FARM PRODUCTION REGIONS**



an important Ohio farm income source, especially in northeastern Ohio, due to a comparative advantage in forage production, to existing investments in modern on-farm dairy facilities and an extensive milk processing industry, and to excellent markets in urban areas in Ohio and nearby states.

Although Ohio is an important livestock state, still ranking eighth among all states in hog production and twenty-third in cattle, its ranking has been declining. High grain prices (due to Ohio's favorable export location vis-a-vis Seaway, Atlantic and Gulf ports) have made feed grains comparatively expensive in the eastern Corn Belt and have tended over the years to shift the center of cattle and hog production further west (Governor's Commission, Schertz, et al.). In Appalachian Ohio in the southeast, however, beef cow-calf enterprises remain a primary source of farm income, a consequence of low-cost forages in an area of abundant untillable grasslands.

Poultry enterprises have been an expanding part of the state's agricultural economy. Egg production has risen rapidly in the past decade and now nearly equals all Ohio consumer demand. Continued expansion is likely due to the availability of land, labor, and feed and the proximity to major metropolitan markets in Ohio and the East. But the growth of this industry in Ohio introduces large, vertically integrated businesses that are quite unlike the midwestern tradition of family farm agriculture.

## Public Data Series

The Federal government, through the National Agricultural Statistics Service and the Economic Research Service in the U.S. Department of Agriculture (USDA) and the Census of Agriculture from the Department of Commerce, has for many years provided data concerning production and prices of major farm commodities, input prices and usage, and characteristics of farmers, farm workers and farm households (Gardner). These primary data series are used to produce a range of statistical information including price indices, costs of production, and indicators of farm income and wealth. In addition, many Land Grant Universities and state departments of agriculture collect data of importance to their states, including production costs, real estate prices and local commodity prices. Finally, private interests also generate trade data concerning farm prices, production, consumption and exports.

The 1980's, a period of substantial financial stress for agriculture, also witnessed a retrenchment of state and federal budgets and public services. Data series relating to agriculture are among the services that public agencies have terminated or interrupted. Some of these series are seen to be matters of public obligation more than of service, such as the public responsibility to foster a competitive market environment, and are therefore less subject to budget-cutting than other activities.

There are essentially three categories of agricultural data: (1) market data versus structural data, (2) current versus historical data and (3) publicly-funded versus private data (Just). Recent decades have witnessed a rapid increase in privately-collected data, largely by agricultural businesses with a need for detailed and current information about conditions in the markets in which they buy and sell daily. But the merit of depending solely on private sources for such data is arguable (Bonnen, Kohls), particularly since private data are proprietary and intended for private competitive advantage, and not for sharing with other market participants in order to enhance competition. The latter is exclusively a public concern and is the basis for public funding of market information that is available to all at little or no direct cost.

## Objectives of the Study

This study makes its contribution principally to that component of data that can be classified as (1) structural (rather than market) and (2) historical over time (as opposed to current). Data of this sort are less readily collected by private sources, perhaps because the data are more closely related to long-range planning than to the short-range daily priorities of profit-driven management.

But historical and structural data have been judged among the least affordable public services when public budgets fall, even though there may be long-range costs when public policy must be developed at some future time from marginal information on structural or other socioeconomic factors. Data needs would include income, employment, resource distribution and control, demographics, purchasing and consumption patterns, and attitudes and beliefs about social issues and public policies.

It is to this data set that this study seeks to make a contribution. At a time when substantial changes have been occurring in farming, budget reductions have substantially reduced the public capacity for maintaining a record of those changes.

**Specific goals** to be accomplished in this study of change over time were:

1. To develop a panel of farm operator households that can be maintained as representative of Ohio production agriculture, by farm size, for several years;
2. To design a data collection system to record socio-economic information annually from this panel for several years;
3. To conduct personal telephone interviews with this panel of farm operator households to gather data regarding:
   (a) the farm business—(e.g., production, marketing, labor, financial)
   (b) the household—(e.g., family composition, farm/nonfarm employment, income, assets, debts)
   (c) the community—(e.g., as reflected in attitudes and/or dispositions toward public policy, program participation, memberships, present and future prospects, etc.)
4. To analyze the data generated by the above in order to provide public and private decision makers (including the participants and the public) with information from a substantial data base stratified by farm sales classes with data concerning (for example):
   (a) the economic performance of Ohio farm businesses and households
   (b) the structure of Ohio production agriculture
   (c) production input purchasing and product sale patterns
   (d) farm operator household financial and demographic profiles

### Procedure

A longitudinal study is one that is designed to examine change over time. This means that both (1) the data collection and (2) the data analysis must be designed to allow parallel comparisons to be made as time passes. Not only must the sample of respondents that was drawn for this 1986 survey be representative of the entire 1986 population of farm operator households, but subsequent samples that are representative for subsequent time periods must be surveyed in the same manner, and responses be obtained from the same questions about the same areas of inquiry.

Longitudinal statistical analysis includes a family of techniques such as Markov chains, path analysis, panel regression and time-series analysis. The bibliography of longitudinal studies is extensive (Abeles) and expositions on design are readily available in a number of methods texts in social research (see Coleman, Goldstein, Kessler, for example). Longitudinal techniques have been used frequently by educators, demographers, psychologists, sociologists and others in examining change in variables as diverse as educational development, aging, behavior, and social characteristics (Abeles).

### Telephone Interviews and Mail Questionnaires

Results reported here were obtained from telephone interviews with 940 farm operator households, and from 503 mail questionnaires these households returned. Results are reported in categories arranged according to farm size as measured by gross farm sales in 1986. Telephone interviews were detailed, took about an hour, and were based on a 35-page questionnaire divided into the following parts:

| Subject | Pages |
|---|---|
| Screening and Overview | 5 |
| Section 1—Demographics | 1 |
| Section 2—Operator Farm & Off-Farm Work | 8 |
| Section 3—The Farm Enterprise | 16 |
| Section 4—Operator Income | 1 |
| Section 5—Family Household Income | 4 |
| Total | 35 |

Interviews seldom required all 35 pages, however. Animal agriculture pages in Section 3, for example, would be skipped in interviews with cash grain operators. Interviews were conducted in evenings beginning in February. The intent was to cluster them around tax completion dates so that tax records for 1986 could be available as references or memory refreshers. Interviewing ran into May, however, before it was completed.

About 25 interviewers were employed; all had farm backgrounds; nearly all were women, most of them farmers' wives, and many had previous interviewing experience. They all understood the topics they needed to discuss in the interviews. Nevertheless, they all had a one-day training session, and interviews were done under the supervision of the staff conducting the research.

## THE CENSUS POPULATION AND THE SAMPLE

This study is based on a sample of farm households that actually operated farms in 1986. This is only a share of all the units defined as farms by the census because (1) operators farm land that is rented as well as owned and they pay a rent or share to farm owners who are not operators, and (2) some residents, owners or operators do not regard their unit as a farm, despite census definitions. Rural acreages that do not support the household and operations like nurseries and greenhouses provide examples (Table 1 and footnotes).

In 1987 the U.S. Census of Agriculture defined a farm as any enterprise that earned (or normally would earn even if not in the census year) $1,000 or more annually from farm product sales. Using this definition, the Census recorded 79,277 Ohio farms. In 1987, the Ohio Agricultural Statistics Service (OAS) had addresses, with acreage and enterprise estimates, for 70,074 of these 79,277 farms. Although 12 percent smaller than the census enumeration (the difference was assumed to be randomly distributed), this address list was treated as the Ohio population from which a stratified sample of farm operator households could be drawn (Table 2). The OAS list is the most complete list of farms available. The complete list of farms from the Census exists but it was not available for use by this study.

Budget limits dictated a sample no larger than 1,000. Confidentiality rules denied access to the list of 70,074. Hence OAS, using farm size intervals given by the researchers, developed a stratified list of 3,000 contacts from which it judged a random sample of 1,000 could be drawn by sampling at their specified rates and assuming that the list was accurate. From that list, 2,263 contacts generated a sample (with interviews) of 940 operators (Tables 1 and 2).

Sample reliability is indicated by the probability that the population mean lies within a specified range of the sample mean. Probabilities that the mean gross sales for the population lies within 5 or 10 percent of the mean gross sales of the sample are the following:

| Sales Interval | Within 5 Percent | Within 10 Percent |
|---|---|---|
| Under $10,000 | .50 | .89 |
| $10—19,999 | .99 | .99 |
| $20—39,999 | .99 | .99 |
| $40—99,999 | .99 | .99 |
| $100—249,999 | .99 | .99 |
| $250—499,999 | .95 | .99 |
| $500,000 + | .68 | .95 |
| Total | .98 | .99 |

Inaccuracies in the address list concerning the true size and activities of individual units, and ignorance of the share that were actually farm operators, produced a sample distribution by size that was different than expected (Tables 1 and 2). Also, when the small importance of farm sales to household income was discovered in the smallest intervals, three were collapsed into one (compare Tables 1 and 2), producing a variance wider than sampling rates were designed to accommodate. This lowered probabilities in the smallest category. But the sample was not increased in that interval because farm income (or loss) had such inconsequential effects on household income that plus-or-minus $510 in 90 percent of the cases was accepted (Table 2 sample mean is $5100).

**Table 1: Percentage Distribution of Telephone Contacts in Developing the 940 Sampled Farm Operator Households, Winter, 1987**

| Farm Size (sales)[1] | Contacts Attempted | Not Reached[2] | Not Farms[3] | Former Farmers[4] | Refused | Sample Completed[5] | |
|---|---|---|---|---|---|---|---|
| | | | | | | Pct. | No. |
| | Number | Percent | | | | | |
| Under $2,500 | 254 | 26.8 | 26.0 | 17.7 | 12.2 | 17.3 | 44 |
| $2,500-4,999 | 161 | 14.3 | 9.9 | 34.8 | 13.0 | 28.0 | 45 |
| $5,000-9,999 | 263 | 14.8 | 12.2 | 26.2 | 14.8 | 32.0 | 84 |
| $10,000-19,999 | 222 | 13.1 | 8.1 | 14.4 | 11.7 | 52.8 | 117 |
| $20,000-39,999 | 312 | 6.7 | 3.8 | 21.8 | 20.5 | 47.2 | 147 |
| $40,000-99,999 | 449 | 12.2 | 4.9 | 12.9 | 24.3 | 45.7 | 205 |
| $100,000-249,999 | 305 | 10.2 | 3.6 | 6.2 | 30.8 | 49.2 | 150 |
| $250,000-499,999 | 204 | 15.7 | 3.4 | 5.9 | 24.0 | 51.0 | 104 |
| $500,000+ | 93 | 19.3 | 7.5 | 2.2 | 23.7 | 47.3 | 44 |
| Number | 2,263 | 316 | 191 | 361 | 455 | — | 940 |
| Percent | 100 | 14.0 | 8.4 | 16.0 | 20.1 | 41.5 | — |

[1] Including government payments but excluding imputed rental value of household residence.
[2] No answer, no phone, moved, wrong address, etc.
[3] Rural residences with acreage not related to farming appeared frequently in the smallest sales interval. Among large operations, some, like nurseries or greenhouses, considered themselves not to be farms, despite census definitions.
[4] Deceased, retired, or quit. Typically, the land was farmed by an operator at another address.
[5] Completed by expected size categories. Actual size distribution of these 940 appears in Table 2.

Source: Ohio Agricultural Statistics Service and survey data.

**Table 2: Ohio Farms and Farm Operator Households by Sales Class: Population, Mean Sales, and Operator Sample, 1987**

| Farm Size (Sales) | Farm Population | | Operator Population | | Operator Sample | |
|---|---|---|---|---|---|---|
| | OAS Address List[1] | Mean Sales in thousands[1,2] | Operators as a Percent of OAS List[3] | Projected Number of Operators[4] | Number of Operator Households[5] | Mean Sales in thousands[2] |
| Under $10,000 | 30,333 | $ 2.8 | 0.482 | 14,621 | 262 | $ 5.1 |
| $10—19,999 | 9,270 | 14.6 | 0.740 | 6,860 | 124 | 14.7 |
| $20—39,999 | 10,108 | 28.7 | 0.725 | 7,328 | 122 | 30.3 |
| $40—99,999 | 11,597 | 64.1 | 0.797 | 9,243 | 180 | 66.0 |
| $100—249,999 | 7,005 | 152.0 | 0.891 | 6,241 | 165 | 163.4 |
| $250—499,999 | 1,473 | 333.5 | 0.890 | 1,311 | 54 | 324.7 |
| $500,000 + | 288 | 819.2 | 0.880 | 253 | 33 | 692.6 |
| Total | 70,074[1] | — | — | 45,857 | 940 | — |

[1] From Ohio Agricultural Statistics.
[2] Mean sales for the population are for farms, while mean sales for the sample are for farm operator households. Thus census farms under $10,000 in sales, and averaging $2,807 in income, often were rented to operators who consolidated larger units; farm operators under $10,000 averaged $5,100 in sales. Conversely, the largest operations, those over $500,000 in sales, typically required more than one household for their operation.
[3] Computed from Table 1: (Sample Completed plus Refused) divided by (Contacts Attempted minus Not Reached).
[4] Product of "OAS Address List" and "Operators as a Percent of OAS List."
[5] Sample distribution in Table 1, corrected for size errors in OAS list.

Source: Ohio Agricultural Statistics Service and Table 1.

The "operator population" in Table 2 is an estimate derived from the telephone interviews. Some "farmers" on the OAS list were not "farm operators." They may have owned parcels of land but rented these to others to farm, or they may have lived on small farms and hired others to farm them. The percent of those contacted who said that they did not operate a farm is shown in Table 2. The projected number of "farm operators" in each sales class is estimated by multiplying the number of farms in each sales strata of the OAS by the proportion of respondents who regarded themselves as farm operators.

The sample, then, statistically represents farm operators, not farms. The unit of observation is a farm operator household (with both farm and nonfarm income), and not just a farm business.

The OAS list contained estimates of annual gross sales for each farm. These estimates were used to place farms in sales strata, and farms in the sample were randomly drawn from these strata. Obviously, some differences occurred in the annual gross sales estimates and the gross sales actually reported by farms in the sample. For example, the OAS list yielded only 33 completed interviews in the top size category (Table 2) instead of the expected 44 (Table 1). This smaller number reduced sample reliability in the largest sales category.

Ohio households in the sample statistically represent population farm households with the same gross sales class interval. The number of farm operator households in the population that is represented by each sample household is estimated to be the following:

| Gross Farm Income in Sample | Number of Population Households Per Sample Household |
|---|---|
| Under $10,000 | 55.8 |
| $10—$19,999 | 55.3 |
| $20—$39,999 | 60.1 |
| $40—$99,999 | 51.4 |
| $100—$249,999 | 37.8 |
| $250—$499,999 | 24.3 |
| $500,000 + | 7.7 |

# THE IMPORTANCE OF FARM SIZE AND NON-FARM INCOME

### Some Introductory Observations:

**Census Definition of "Farm."** The primary object of the Census is always the Constitution-driven intent to *enumerate*, to take a total count. Consequently, the definition is intended to be all-inclusive; its object is to identify *all* farms, to the point of excluding only the merest gardens for hobby or home consumption. The 1982 Census defined a farm as any production unit that generated $1,000 or more in sales in that year. Hence, enterprises as modest as a pick-your-own strawberry patch or the children's sweet corn sales in July could have qualified and been included. Not surprisingly, multitudes of inclusions like these laid against a comparatively small number of genuinely commercial farm operations will have a distorting influence on averages.

**Extreme Variations in Farm Size.** Since the range in farm size (in Ohio or the U.S.)

**Table 3: Percentage Distribution of Farms, Farm Sales, and Farm Operators by Sales Class, 1986[1]**

| Farm Size (sales)[2] | U.S. Farms (2.241 mil.)[3] | U.S. Farm Sales[3] | U.S. Farm Operators[4] | Ohio Farm Operators[4] | Ohio Farm Operator Sales[4,5] |
|---|---|---|---|---|---|
| Under $10,000 | 52.1 | 2.9 | 39.8 | 31.9 | 2.9 |
| $10,000-19,999 | 10.7 | 2.6 | 12.3 | 15.0 | 3.9 |
| $20,000-39,999 | 10.1 | 4.9 | 12.3 | 16.0 | 8.5 |
| $40,000-99,999 | 13.3 | 15.7 | 16.9 | 20.2 | 23.3 |
| $100,000-249,999 | 9.5 | 25.2 | 14.1 | 13.6 | 38.8 |
| $250,000-499,999 | 2.8 | 16.6 | 3.5 | 2.9 | 16.5 |
| $500,000 + | 1.5 | 32.1 | 1.9 | 0.5 | 6.1 |
| Total | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |

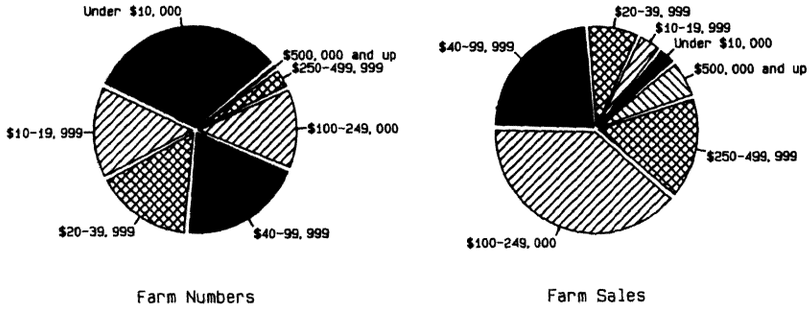
[1] The difference between farms and farm operators is the difference between land ownership, which includes inactive owners who rent, and the actual management and risk acceptance of a farm operation. The Ohio study was confined to farm operators. Landlords who merely rented land were not interviewed.
[2] Including government payments.
[3] 1982 Census.
[4] USDA (1985) and survey data.
[5] Not sales per farm but per farm operator household. This tends to understate the importance of the largest farms because they typically support more than one household.

Source: U.S. Census, USDA, and survey data.

is so extreme, and the income prospects so closely related to farm size, it is clear that isolating farm financial stress (principal motivation for this survey) and its causes requires an examination of farms in several sales class intervals.

Consider Tables 3 and 4, for example. More than half of all U.S. farms had annual product sales under $10,000 in 1982 but contributed less than 3 percent to total farm output (Table 3 and Figure 2). Nearly 40 percent of all U.S. farm operators and over 30 percent of Ohio farm operators were in this category (Table 3). In both cases the households were maintained not by farm product sales but by nonfarm income (Table 4 and Figure 3).

**FIGURE 2: OHIO FARM OPERATORS AND FARM SALES BY SIZE CLASS**




Source: Table 3.

**Table 4: Average Farm Operator Income per Household. U.S. and Ohio Estimates, 1986 (thousand dollars)**

| Farm Size (sales)[1] | U.S. Farm Operators | | | Ohio Farm Operators | | |
|---|---|---|---|---|---|---|
| | Non-Farm | Net Farm | Total | Non-Farm | Net Farm | Total |
| Under $10,000 | 30.7 | 1.3 | 32.0 | 24.0 | -2.0 | 22.0 |
| $10,000-19,999 | 31.4 | 2.6 | 34.0 | 23.6 | -2.5 | 21.1 |
| $20,000-39,999 | 19.9 | 7.2 | 27.1 | 23.4 | -1.3 | 22.1 |
| $40,000-99,999 | 14.8 | 10.8 | 25.6 | 18.8 | 8.5 | 27.3 |
| $100,000-249,999 | 14.4 | 24.4 | 38.8 | 18.1 | 26.0 | 44.1 |
| $250,000-499,999 | 21.0 | 70.3 | 91.3 | 17.6 | 43.7 | 61.3 |
| $500,000 + | 34.1 | 141.8 | 175.9 | 19.2 | 140.7 | 159.9 |
| All farms | 24.3 | 11.9 | 36.2 | 21.8 | 6.0 | 27.8 |

[1] Including government payments

Source: USDA and survey data.

## Census and Survey Farms Fit into Three Categories

Hence, in these cases (under $10,000), what the Census enumerated as "farms" might realistically be regarded merely as rural residences. Much the same can be said for all sales classes under $40,000. Both U.S. and Ohio households of these sizes typically are maintained by nonfarm income rather than by farm output (Table 4). In 1986, 64 percent of U.S. farm operator households (on average) depended almost entirely on nonfarm income, and 63 percent of these surveyed Ohio operator households were in sales classes where nonfarm household income subsidized losses in the farm operation (Tables 3-5). Even in the $40,000-99,999 sales class, more operator households than not got most of their support from nonfarm rather than farm income (Tables 4 and 5). All these farms ($40,000-99,999) display, on average, the characteristics of part-time operations.

The larger farms, with annual sales of $100,000 or more, account for only 13.8 percent of all farms (17 percent of Ohio farm *operators* and 19.5 percent of U.S. farm *operators*). But these few farms produced nearly two-thirds of Ohio farm output and three-fourths of U.S. farm output (Table 3). These are the genuinely commercial farm operations.

Hence the distribution of farms by size is very skewed, and the Census definition creates a misleading impression of the number of U.S. "farms" that are responsible for food and fiber production.[1] Most Census farms are *rural residences.*

[1] Declining farm numbers, one should note, do not mean that farming is less "important" to U.S. society than in the past; the acres are still there, and their output continues to rise. Nor does the political importance of farming decline in proportion to the number of farmers or their share of the population. Many states still do and may always depend on agriculture as a principal component of their tax base. Those state legislatures and senators in the U.S. Senate, remain alert to the needs and welfare of agriculture in their state. Finally, as noted in the introduction, farming is an integral component of a food and fiber sector that is an important share of the U.S. economy.

Another third are *part-time farms* providing only supplementary income to households supported primarily by nonfarm income, and only about 14 percent are *commercial farms*. These operations generate 75 percent of all the output and sales.

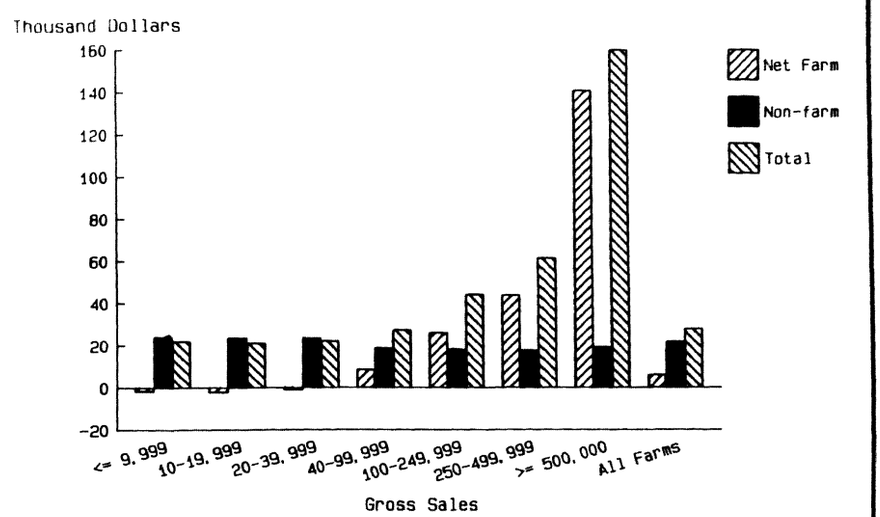
Clearly, the availability of nonfarm employment in a densely populated state provides options for farm operator households that are helpful in coping with the financial stress in farming that has characterized the 1980's. But the financial difficulties in farming itself that are found in Ohio agriculture present a condition that is shared by many U.S. farm families.

### Some Demographic Differences

Table 6 summarizes some characteristics of the 940 sampled households in the last column of Table 2. First glance shows an apparent uniformity of characteristics across all farm sizes in the sample. But there are some interesting differences. On the smallest farms (under $10,000 sales), more than any other, operators came to farming, on the average, from another occupation; the operator and spouse had been married (and earned income) for more than three years before beginning their farming experience. Perhaps for many people in this category, their main intent was only to have a rural residence. In fact, averages show at least a year of marriage before farming for operators within all sales classes up to $100,000. All other operators ($100,000 and up) were farming even before they were married. Perhaps smaller operators never intended farming to provide their main income; at least by 1986, according to Table 5, they were earning much more off the farm than on it.

Another observation: in contrast to smaller operators who appear to have come to farming with outside income already established, the larger operators, judging by the age when they started farming, began their careers as second or third generation arrivals on farms that already were established. They began farming three to seven years sooner than operators on the small farms, yet still had time to obtain more education. This inter-generation transfer is of course a typical characteristic

**FIGURE 3: OHIO FARM OPERATOR HOUSEHOLD INCOME**




Source: Table 4.

**Table 5: Nonfarm Income of Ohio Farm Operator Households, Percentage Distribution by Source, and Nonfarm as a Percent of Total Household Income, 1986**

| | Percent of Nonfarm Income Contributed by:[2] | | | Total Nonfarm Income | |
|---|---|---|---|---|---|
| Farm Size (sales)[1] | Operator | Spouse and Family | Other[3] | Dollars[2] | Pct. of all Income |
| Rural Residences | | | | | |
| Under $10,000 | 52.8 | 19.9 | 27.3 | 24,060 | 109.1[4] |
| Part-time Farms | | | | | |
| $10-19,999 | 49.7 | 20.9 | 29.4 | 23,614 | 112.8[4] |
| $20-39,999 | 50.4 | 24.9 | 24.7 | 23,387 | 105.9[4] |
| $40-99,999 | 41.2 | 30.1 | 28.7 | 18,787 | 68.8 |
| Commercial Farms | | | | | |
| $100-249,999 | 15.5 | 49.4 | 35.1 | 18,143 | 40.9 |
| $250-499,999 | 14.2 | 51.1 | 34.7 | 17,599 | 29.3 |
| $500,000 + | 13.6 | 30.9 | 55.5 | 19,210 | 12.0 |
| All farms[5] | 44.6 | 26.8 | 28.6 | 21,827 | 78.7 |

[1] Including government payments (these are counted as farm income).
[2] Column 4 (shown in dollars) equals 100.0 percent of nonfarm income.
[3] Includes savings, financial investments, nonfarm real estate, business earnings, etc.
[4] Percentages over 100.0 mean that nonfarm income was covering farm losses recorded in Table 4.
[5] In all estimates of averages for All Farms, survey data is weighted.

Source: Survey data.

**Table 6: Characteristics of 940 Farm Operator Households, 1986**

| Sales Class | Farm Operator Years Age | Years Education | Years Farming | Years Married | Children at Home |
|---|---|---|---|---|---|
| Under $10,000 | 56.1 | 12.3 | 27.0 | 30.3 | 0.9 |
| $10-19,999 | 53.0 | 12.9 | 26.8 | 27.9 | 1.1 |
| $20-39,999 | 52.7 | 12.4 | 26.9 | 28.1 | 1.1 |
| $40-99,999 | 47.8 | 12.2 | 22.7 | 23.7 | 1.4 |
| $100-249,999 | 46.1 | 12.6 | 24.0 | 23.0 | 1.5 |
| $250-499,999 | 48.5 | 13.2 | 25.9 | 25.4 | 2.0 |
| $500,000+ | 48.3 | 13.2 | 26.0 | 24.1 | 1.6 |
| All Farms | 51.8 | 12.5 | 25.7 | 27.2 | 1.2 |

Source: Survey data.

**Table 7: Number of Farm Operators by Age and Education, 1986**

| Years of Education | Years of Age 21-34 | 35-49 | 50-64 | 65+ | Total |
|---|---|---|---|---|---|
| Under 12 | 15 | 11 | 59 | 53 | 138 |
| 12 | 73 | 187 | 220 | 81 | 561 |
| 13-15 | 21 | 46 | 31 | 13 | 111 |
| 16 or more | 21 | 55 | 34 | 12 | 122 |
| Total | 130 | 299 | 344 | 159 | 932 |

Source: Survey data.

**Table 8: Farm Operator Household Balance Sheet, U.S. and Ohio Estimates, December 31, 1986**

| Sales Class | U.S. Farm Operators[1] Assets | Liabilities | Equity | Ohio Farm Operators[1] Assets | Liabilities | Equity |
|---|---|---|---|---|---|---|
| | $1,000 | | | | | |
| Under $10,000 | 144 | 15 | 129 | 208 | 14 | 194 |
| $10,000-19,999 | 192 | 21 | 171 | 237 | 33 | 204 |
| $20,000-39,999 | 228 | 36 | 192 | 265 | 40 | 225 |
| $40,000-99,999 | 327 | 76 | 252 | 357 | 58 | 299 |
| $100,000-249,999 | 508 | 140 | 368 | 548 | 147 | 401 |
| $250,000-499,999 | 838 | 261 | 577 | 976 | 321 | 654 |
| $500,000 + | 2,019 | 617 | 1,402 | 1,380 | 407 | 972 |
| All farms | 300 | 65 | 235 | 326 | 59 | 267 |

[1] May not always add to proper totals due to rounding error. Ohio figures are detailed in Table 9.

Source: Ohio survey data and U.S. Department of Agriculture, Economic Indicators of the Farm Sector, National Financial Summary, 1986. ECIFS 6-2. December 1987.

for many farms, commercial or not.

The educational background of farm operators is summarized in Table 7. More than 60 percent had 12 years of education. Among those with less education, more than 80 percent were 50 years or older; nearly 40 percent were 65 or older. Among those with more than 12 years education, more than 60 percent were younger than 50 years old. There were college graduates in all age categories, but most were under 50. Hence, education and age are inversely related; older operators generally have fewer years of education. This is not surprising. In the lives of these older operators, the emphasis on college education seems to be a recent development. When they were young, 12 years or less of formal education was common.

## OHIO FARM OPERATOR HOUSEHOLD BALANCE SHEETS

The assets and liabilities of U.S. and sampled Ohio farmers on December 31, 1986 are summarized in Table 8. The average balance sheet for Ohio operator households in each sales class on that date appears in Table 9. These data are reconstructed as percentages in Table 10.

The assets held by farm operator households consist rather uniformly of 50-60 percent real estate. Of remaining assets, non-real estate or "other" farm assets are an increasing share as size increases; and nonfarm assets are a decreasing share. Larger operations are more specialized and more committed to agriculture. This shows up in an increasing share of non-real estate assets being tied up in equipment and inventory rather than in investments off the farm (Tables 9 and 10).

Commercial banks and the Farm Credit System consistently carry most of the loans; half to two-thirds. Farmers Home Administration (FmHA) is relatively more important among small operations; insurance companies more so among the largest (Tables 9 and 10).

The category "individuals and others" is a mixed set. Most of the individual

financing probably is for long-term debt such as farm transfers. Another important component is open accounts with merchants for short-term credit on operating costs in the growing season.

**Debt/Asset Ratios**

Debt loads rise as farm size increases. Generally, small operations have lower debt loads (Table 10). But within size categories there are wide variations in the ratio of debts to assets or debts to equity, and difficulties with debt are evident among operations of all sizes (Table 11, Figure 5). As the debt/asset ratio (or leverage) rises, so does the difficulty of managing that debt and the risk to the financial survival of the farm. Lenders tend to regard ratios above .40 with caution and above .70 as high risk. Note in Table 10 that the average ratio for all operations with sales above $250,000 was around .30 percent, and in Table 11 we see that nearly two-fifths of those commercial farms with annual sales of $250,000 or more had ratios above 40 percent in 1986.

These high percentages of borrowed capital are in part a product of high interest rates and reduced asset values, but they also reflect a competitive pressure to expand operations to a point where they are large enough to support a household. We see in Table 5 that smaller operations depend heavily on nonfarm income, and from this income they may in time finance expansion of their farming operation. Table 11, by contrast, shows that larger operations, already committed to heavy investments of time and labor, turn to borrowed capital (instead of nonfarm jobs) to finance operations and perhaps continued expansion as well.

Finally, the high debt/asset ratios in Table 11 are also a reflection of simultaneous

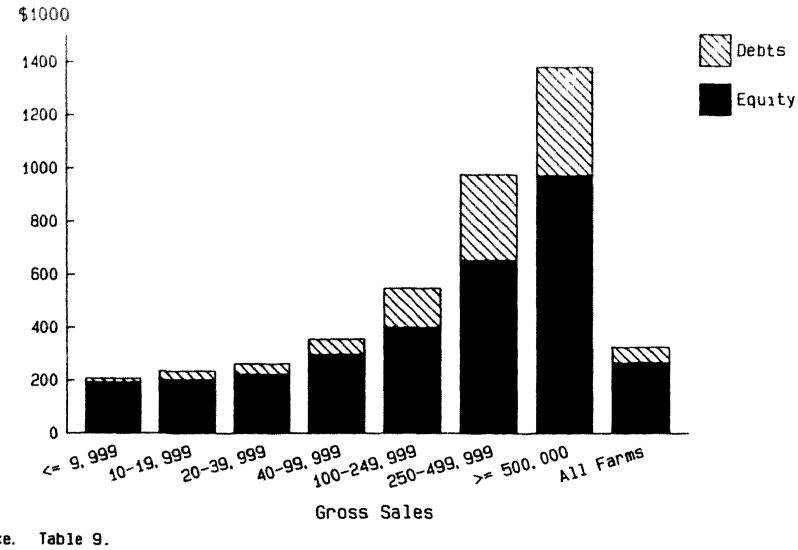
**Table 9: Balance Sheet per Farm Operator Household, by Farm Size, December 31, 1986[1]**

| | | Farm Size (Sales) Class | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Balance Sheet Item | All Farms (Average)[2] | Under $10,000 | $10,000 19,999 | $20,000 39,999 | $40,000 99,999 | $100,000 249,999 | $250,000 499,999 | $500,000 and up |
| Assets | | | | | | | | |
| Farm Real Estate | $180,966 | $116,027 | $146,556 | $156,704 | $191,791 | $287,510 | $534,416 | $711,188 |
| Other Farm | 105,654 | 46,797 | 45,632 | 75,139 | 133,771 | 225,592 | 384,202 | 602,935 |
| Non-Farm | 39,583 | 45,482 | 44,395 | 32,819 | 31,605 | 35,268 | 57,068 | 65,776 |
| Total Assets | 326,203 | 208,306 | 236,583 | 264,662 | 357,167 | 548,370 | 975,685 | 1,379,899 |
| Liabilities (owed to) | | | | | | | | |
| Farm | | | | | | | | |
| Commercial Banks | 16,410 | 4,119 | 7,552 | 9,132 | 14,556 | 43,978 | 101,294 | 128,645 |
| Farm Credit System[3] | 19,118 | 1,774 | 14,750 | 14,144 | 15,790 | 53,704 | 107,168 | 97,645 |
| Farmers Home Admin. | 9,765 | 3,972 | 5,450 | 8,968 | 13,383 | 20,386 | 24,454 | 12,081 |
| Savings and Loans | 1,384 | 893 | 1,633 | 367 | 1,578 | 1,384 | 6,647 | 19,225 |
| Insurance Companies | 1,400 | 3 | 34 | 491 | 2,160 | 1,077 | 20,520 | 27,354 |
| Individuals & Others[4] | 6,104 | 1,175 | 1,738 | 4,011 | 4,878 | 15,996 | 43,974 | 78,030 |
| Non-farm[5] | 4,758 | 2,153 | 1,743 | 2,906 | 5,574 | 10,897 | 17,348 | 45,101 |
| Total Liabilities | 58,939 | 14,089 | 32,900 | 40,019 | 57,919 | 147,422 | 321,405 | 407,450 |
| Net Worth | $267,264 | $194,217 | $203,683 | $224,643 | $299,248 | $400,948 | $654,280 | $972,449 |

[1] Excludes CCC loans.
[2] See Table 8.
[3] Includes Federal Land Bank and Production Credit Associations.
[4] Includes mercantile credit, i.e., outstanding operating expenses such as feed, seed, chemicals, fertilizer, fuel etc., and individually-financed transactions.
[5] Includes consumer credit for autos, household goods, personal items, credit cards, and liabilities associated with non-farm assets.

Source: Survey data.

FIGURE 4: HOUSEHOLD EQUITY AND DEBTS, 1986.




Source. Table 9.

occurrences which adversely affected farming beginning in the mid- to late-1970's. First, as inflation rose, so did interest rates throughout the economy. Initially, these higher rates seemed manageable to farmers because inflation drove up farm product prices and land values as well; both cash flow (sales) and capital stock (land used as loan collateral) were rising. But then in the 1980's crop prices began to fall, and with them the value of land. Borrowers were confronted not only with high interest rates and high annual loan payments, but also with reduced income, reduced land prices, and reduced collateral with which to support an increasingly unmanageable debt load. As Table 11 records, for some operators, serious financial problems resulted. In fact, the most severely financially stressed operators in the early 1980's were soon

**Table 10: Percentage Distribution of Balance Sheet Items, Per Farm Operator Household, by Farm Size, December 31, 1986**

| | Farm Size (Sales) Class | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Balance Sheet Item | All Farms (Average) | Under $10,000 | $10,000 19,999 | $20,000 39,999 | $40,000 99,999 | $100,000 249,999 | $250,000 499,999 | $500,000 and up |
| Assets | | | | | | | | |
| Farm Real Estate | 55.5 | 55.7 | 61.9 | 59.2 | 53.7 | 52.5 | 54.8 | 51.5 |
| Other Farm | 32.4 | 22.5 | 19.3 | 28.4 | 37.5 | 41.1 | 39.4 | 43.7 |
| Non-Farm | 12.1 | 21.8 | 18.8 | 12.4 | 8.8 | 6.4 | 5.8 | 4.8 |
| Total Assets | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |
| Liabilities | | | | | | | | |
| Farm | | | | | | | | |
| Commercial Banks | 27.8 | 29.2 | 23.0 | 22.8 | 25.1 | 29.8 | 31.5 | 31.5 |
| Farm Credit System | 32.4 | 12.6 | 44.7 | 35.4 | 27.4 | 36.5 | 33.3 | 23.8 |
| Farmers Home Admin. | 16.6 | 28.3 | 16.6 | 22.4 | 23.1 | 13.8 | 7.6 | 3.0 |
| Savings and Loans | 2.3 | 6.3 | 5.0 | 0.9 | 2.7 | 0.9 | 2.1 | 4.7 |
| Insurance Companies | 2.4 | 0.0 | 0.1 | 1.2 | 3.7 | 0.7 | 6.4 | 6.7 |
| Individuals & Others | 10.4 | 8.3 | 5.3 | 10.0 | 8.4 | 10.9 | 13.7 | 19.2 |
| Non-farm | 8.1 | 15.3 | 5.3 | 7.3 | 9.6 | 7.4 | 5.4 | 11.1 |
| Total Liabilities | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |
| (as % of assets) | 18.1 | 6.8 | 13.9 | 15.1 | 16.2 | 26.9 | 32.9 | 29.5 |
| Net Worth (% of Assets) | 81.9 | 93.2 | 86.1 | 84.9 | 83.8 | 73.1 | 67.1 | 70.5 |

Source: Table 9.

forced out of farming and were no longer available to include in this 1987 survey.

### Variation in Debt/Asset Ratios

Debt/asset ratios appear to be more closely related to age than to anything else. Table 12 and Figure 6 record a debt pattern reflecting the life cycle of the family itself. Young people borrow money (to establish and expand their farming operations, for example); and older people, now virtually debt free, enjoy the fruits of their earlier enterprise.

One can also suppose, judging from the numbers in Tables 11 or 12, that debt loads are also heavier on larger operations and/or among people with more education. But it is wise to be cautious here; we may be just counting the age factor all over again. Recall from Tables 6 and 7 that these older operators with less debt tend also to be the ones with less education and smaller operations.

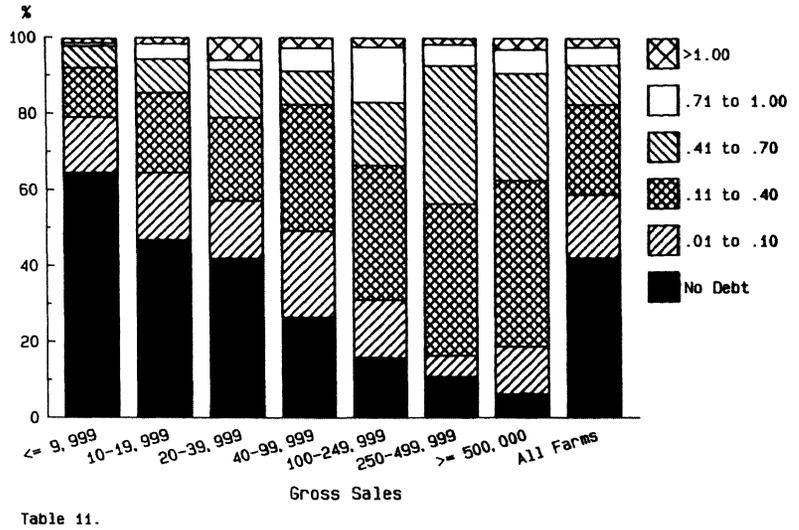
Table 12 does point out, however, that capital intensive operations involving livestock are less often free of debt and may be even more often among those with the heaviest debt loads. But operations with both crop and livestock income may be able to carry a heavier debt load with less financial difficulty.

**Table 11: Debt as a Percent of Assets: Percentage Distribution of Farm Operator Households, by Debt/Asset Ratio and Farm Size, December 31, 1986**

| Farm Size | Debt/Asset Ratio | | | | | |
|---|---|---|---|---|---|---|
| | No Debt | .01-.10 | .11-.40 | .41-.70 | .71-1.00 | Over 1.00 |
| | Percent | | | | | |
| Under $10,000 | 64.5 | 14.5 | 13.0 | 5.7 | 0.8 | 1.2 |
| $10-19,999 | 46.8 | 17.7 | 21.0 | 8.9 | 4.0 | 1.6 |
| $20,39,999 | 42.0 | 15.1 | 21.9 | 12.6 | 2.5 | 5.9 |
| $40-99,999 | 26.5 | 22.7 | 33.2 | 8.8 | 6.1 | 2.8 |
| $100-249,999 | 15.9 | 15.2 | 35.4 | 16.5 | 14.6 | 2.4 |
| $250-499,999 | 10.9 | 5.5 | 40.0 | 36.4 | 5.5 | 1.8 |
| $500,000 + | 6.3 | 12.5 | 43.8 | 28.1 | 6.3 | 3.1 |
| All farms | 42.2 | 16.6 | 23.7 | 10.4 | 4.7 | 2.4 |

Source: Survey data.

**FIGURE 5: DEBT/ASSET RATIO BY SALES**




Source: Table 11.

# FARM INCOME AND EXPENSES

### Gross Farm Income

Income sources are summarized in Table 13 and Figure 7. Row crops (corn and soybeans) are important products on farms of all sizes; wheat is consistently the least important principal product. Hogs consistently become more important as farm size increases. Dairy farms predominate mostly among farms with sales above $100,000 but under $500,000. Beef is the principal source of income only among the smallest farms contributing the least to the household, but perhaps this is because cows on grass come closer to managing themselves than do other enterprises on Ohio farms (Armstrong). Recall that these smallest farms are principally rural residences with acreage, and display a total household dependence on nonfarm income (Table 5). Among smaller farms, cattle income is primarily from calf sales and small groups of feedlot cattle. Among large farms, cattle sales are primarily from fed beef.

Government payments make up 6 to 9 percent of gross farm income. Commercial farms receive greater absolute amounts, but these represent only slightly higher proportions of gross income (from government payments) than for part-time farms or rural residences (Table 13).

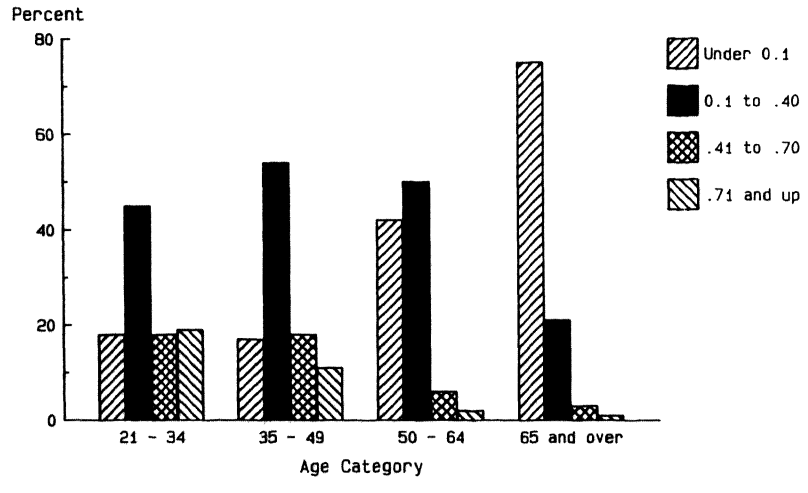
**Table 12: Percentage Distribution of Debt/Asset Ratios by Age, Education, and Farm Enterprise, December 31, 1986**

| Item | Ratio of Debts to Assets | | | | |
|---|---|---|---|---|---|
| | Under 0.1 | 0.1-.40 | .40-.70 | .71 and up | Total |
| Age (N=932) | | | | | |
| 21-34 | 18 | 45 | 18 | 19 | 100 |
| 35-49 | 17 | 54 | 18 | 11 | 100 |
| 50-64 | 42 | 50 | 6 | 2 | 100 |
| 65 and over | 75 | 21 | 3 | 1 | 100 |
| Education (N=932) | | | | | |
| Under 12 years | 59 | 31 | 5 | 5 | 100 |
| 12 years | 35 | 47 | 11 | 7 | 100 |
| 13-15 years | 28 | 49 | 14 | 9 | 100 |
| 16 and over | 26 | 49 | 16 | 9 | 100 |
| Enterprise (N=696)[1] | | | | | |
| 167 dairy farms | 22 | 61 | 11 | 6 | 100 |
| 73 hog farms | 18 | 47 | 19 | 16 | 100 |
| 456 grain farms[2] | 31 | 47 | 13 | 9 | 100 |
| Total Sample[3] | 42 | 41 | 10 | 7 | 100 |

[1] Operations identified by the enterprise that provides over half the gross farm income to the operation.
[2] Corn, beans, wheat, oats.
[3] From Table 11.

Source: Survey data.

**FIGURE 6: PERCENTAGE DISTRIBUTION OF DEBT/ASSET RATIOS BY AGE**




Source: Table 12.

## Farming Expenses

Farm expenses are summarized in Table 14 and costs per dollar of sales in Figure 8. Note that cropping costs as a share of total costs tend to fall as farm size increases. This occurs partly because livestock enterprises become more important and partly because of scale economics and rising productivity that tend strongly to appear among larger farms (see Table 20). Costs for operations, maintenance, and repairs also fall as farm size increases, indicating further that productivity gains and scale economies are at work on capital equipment used in farming. Notice also that hired labor is consistently the smallest cost category, suggesting that, throughout all these size ranges, Ohio farming is still a family activity. However, hired labor costs increase rapidly when farms grow beyond about $100,000 in sales. Perhaps this contrast represents another indication (along with non-farm income) that farms under $100,000 in sales are often part-time operations.

Depreciation, interest and taxes are costs that tend to remain much the same from year to year regardless of quantity or value of output. These are committed costs that are unaffected by the successes or failures of any one growing season. The rise in interest rates in the late 1970's, together with price decreases in the 1980's, are the principal shifters of costs and incomes that produced the debt/asset ratios reported in Table 11. These costs—depreciation, interest, taxes and rent—together constituted the largest single cost category in 1986 and, on the average, were twice as important as the second largest cost category on Ohio farms in that year (Table 14).

## Net Farm Income

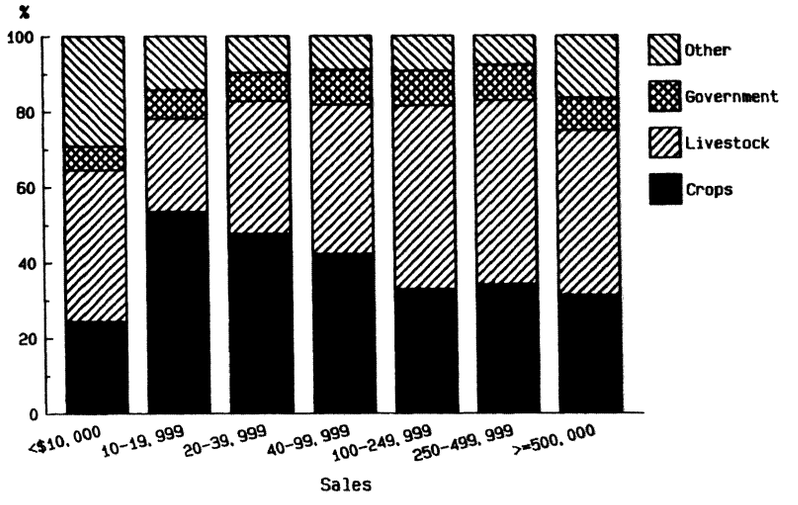
Subtracting expenses in Table 14 from gross income in Table 13 yields net income shown in Table 15. This is the table from which net income was reported at the outset in Table 4.

**Table 13: Gross Income from Farming: Percentage Distribution of Income from Sales and Government Payments per Farm Operator Household, by Farm Size, 1986**

| Farm Size (Sales) | Income From Sales of: | | | | | Government Payments | Other Income[1] | Gross Farm Income[2] |
|---|---|---|---|---|---|---|---|---|
| | Corn and Soybeans | Wheat | Dairy | Hogs | Beef | | | |
| | Percent | | | | | | | -Dollars- |
| Under $10,000 | 20.8 | 3.7 | 1.8 | 4.5 | 33.8 | 6.3 | 29.1 | $ 9,465 |
| $10-19,999 | 46.8 | 6.8 | 3.0 | 6.1 | 15.5 | 7.6 | 14.2 | 20,186 |
| $20-39,999 | 42.6 | 5.1 | 15.5 | 7.6 | 12.0 | 7.5 | 9.7 | 35,456 |
| $40-99,999 | 37.7 | 4.6 | 23.6 | 7.9 | 8.0 | 9.2 | 9.0 | 70,554 |
| $100-249,999 | 30.5 | 2.4 | 32.9 | 10.9 | 4.8 | 9.2 | 9.3 | 168,543 |
| $250-499,999 | 32.0 | 2.2 | 31.9 | 11.7 | 5.1 | 9.4 | 7.7 | 340,348 |
| $500,000 + | 28.8 | 2.5 | 12.6 | 17.9 | 13.1 | 8.6 | 16.5 | 710,208 |
| All Farms | 33.2 | 4.3 | 13.7 | 7.1 | 17.5 | 7.8 | 16.4 | 62,315 |

[1] Includes imputed rental value of residence, rentals, inventory change, and sales of other crops such as hay, orchard crops, other grains, other livestock, etc.
[2] Imputed values (footnote 1, above) make this column differ from the sales column in Table 2 and cause mean sales here to sometimes exceed the interval range.
Source: Survey data.

**FIGURE 7: SOURCES OF FARM RECEIPTS**




Source: Table 13.

### Return on Assets

Table 16 and Figure 9 summarize financial conditions for Ohio farm operator households for year-end 1986. Asset, debt and equity figures come from Table 9; debt/asset ratios and financial stress figures are derived from Tables 10 and 11. Operating return (on assets) is computed by subtracting a charge for management and unpaid labor from net farm income in Table 15, adding interest paid (because lenders own some of the assets), and dividing the result by the value of farm assets (Table 9).

Total returns to capital (assets) consist of two elements: (1) operating returns and (2) total returns, shown at the bottom of Table 16. During the postwar period 1948-1984, the total return on capital invested in farming averaged 10.6 percent annually (Irwin, Forster, and Sherrick). About half of this total was operating return, and the other half came from appreciation in asset values. This provides some perspective for the figures that appear at the bottom of Table 16.

Note that all farms in this sample averaged a negative operating return, but that commercial farms (sales over $100,000) had a positive return in response to efficiencies that smaller farms did not, on the average, display (Figure 9). To each of these operating returns, an adjustment for change in asset values is needed in order to estimate total return on assets. Asset value changes would include land, buildings and equipment (inventory change is already included in the determination of net operating return). Much of this adjustment would not differ by farm size. For

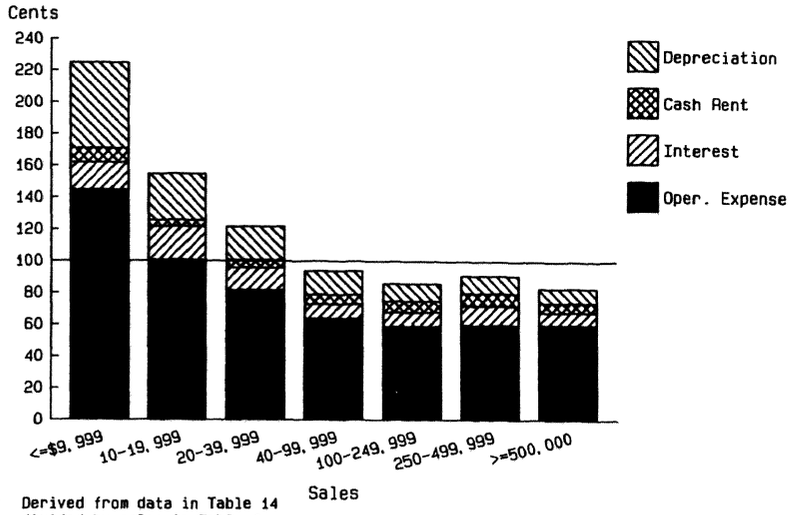
**Table 14: Total Farm Expenses: Percentage Distribution of Farm Expenses Per Operator Household, by Farm Size, 1986**

| Farm Size (Sales) | Cash Expenses for: Crops[1] | Livestock[2] | Bldgs. and Equipment[3] | Hired Labor | Depreciation Interest Taxes Rent[4] | Other[5] | Total Expenses |
|---|---|---|---|---|---|---|---|
| | Percent | | | | | | –Dollars– |
| Under $10,000 | 17.3 | 7.9 | 13.4 | 2.8 | 42.6 | 16.0 | $ 11,487 |
| $10-19,999 | 20.7 | 9.7 | 12.9 | 1.5 | 38.6 | 16.6 | 22,715 |
| $20-39,999 | 20.4 | 12.0 | 12.9 | 2.7 | 35.8 | 16.2 | 36,737 |
| $40-99,999 | 20.9 | 12.8 | 10.4 | 2.6 | 35.5 | 17.8 | 62,077 |
| $100-249,999 | 18.6 | 14.9 | 9.6 | 5.1 | 33.9 | 17.9 | 142,607 |
| $250-499,999 | 16.3 | 16.2 | 8.4 | 7.1 | 35.5 | 16.5 | 296,656 |
| $500,000 + | 15.3 | 20.3 | 7.4 | 7.1 | 28.5 | 21.4 | 569,477 |
| All farms | 19.2 | 11.1 | 11.9 | 3.0 | 38.0 | 16.8 | 56,334 |

[1]Includes seed, chemicals, fertilizer, lime, etc.
[2] Includes feeders, feed, salt, feed additives, etc.
[3] Includes repairs, parts, fuel, etc. for productive assets. Excludes expenses on operator's house.
[4] Includes only real estate taxes but not all interest expenses.
[5] Includes unallocated costs such as conservation expenses, professional services, utilities, etc.

Source: Survey data.

**FIGURE 8: EXPENSES PER DOLLAR SALES**




Source: Derived from data in Table 14 divided by sales in Table 2.

example, the average per acre value of Ohio farm land and buildings was $1126 in February 1985, $1013 in 1986, and $942 in 1987 (USDA). Hence, these February-to-February values declined by 9.0 percent from 1985 to 1986, and by another 9.3 percent from 1986 to 1987. Using 9.3 percent (ignoring equipment) to illustrate the adjustment in operating returns generates a total return on assets of −12.7 percent for all farms (−9.3 and −3.4, Table 16) and −4.9 percent (−9.3 and 4.4) for farms with 1986 gross sales over $100,000.

It is proper to regard operating return on assets as a direct consequence of the quality of management (and resources under its control). Table 16 (and pages which follow) provide evidence of superior management on large farms (e.g., sales over $100,000) compared to that of the average Ohio farm operation.

But total return on assets, which includes change in asset values, involves factors that are beyond the capacity of household management to affect. These factors include public policies which bear upon product prices and interest rates. These, in

turn, are direct determinants of farmland prices; as the return on productive investment declines, so does the value of the investment. Given the policy environment of the 1980's, farm asset values declined. In 1986, the decline in Ohio was sufficient to generate a negative return on assets, despite a positive operating return among the better-managed commercial operations (Table 16).

## COPING WITH FINANCIAL STRESS

Farm financial circumstances for the great majority of Ohio farm households in 1986 were unsatisfactory. This untenable farm condition ranged from merely disappointing, among those who recalled the better years (or functioned on nonfarm income anyway), to impending and incomprehensible losses of farms and homes that had been in families for generations.

Probably anyone with any indebtedness in the 1980's, from credit cards to mortgages, recalls increasing debt burdens as interest rates rose. Among farm households with nonfarm income (and this is nearly all of them), there had been by 1986 ample opportunity for family reflection on the income-producing merits of farm versus nonfarm work. Lenders, who view debt loads over 40 percent of assets as potentially troublesome, had watched with concern as debt loads rose and troubles appeared.

This survey inquired about these changes in the sampled operator households and found a correlation between farms with high debt/asset ratios (Table 11) and households with financial difficulties, emotional stress, and negative attitudes about their prospects (Table 17).

Table 11 records 17.5 percent of the sample with debt/asset ratios above .40. In Table 17, 15.2 percent of all respondents confirmed this debt level. Most of these felt in worse financial condition than their neighbors and said that their debt load caused problems with their lenders. Many recognized that they were worse off than five years before; they could cite changes in their expenses and consumption patterns to illustrate this, and they were feeling nervous, worried, and unhappy about their predicament. Even if they weren't in trouble with their lenders, nearly 30 percent thought their long-term prospects for staying on the farm were small; and over 40 percent were unwilling to recommend farming as a way of earning a living (Table 17).

## FARM OPERATIONS

### Acres Operated

With modern equipment, one man does what was done by three or four a generation

**Table 15: Gross and Net Farm Income Per Operator Household, by Farm Size, 1986**

| Farm Size (Sales) | Gross Farm Income | Total Farm Expense | Net Farm Income (Loss) |
|---|---|---|---|
| Under $10,000 | $ 9,465 | $ 11,487 | $ (2,022) |
| $10-19,999 | 20,186 | 22,715 | (2,529) |
| $20-39,999 | 35,456 | 36,737 | (1,281) |
| $40-99,999 | 70,554 | 62,077 | 8,477 |
| $100-249,999 | 168,543 | 142,607 | 25,936 |
| $250-499,999 | 340,348 | 296,656 | 43,692 |
| $500,000+ | 710,208 | 596,477 | 140,731 |
| All Farms | $ 62,315 | $ 56,334 | $ 5,981 |

Source: Tables 13 and 14.

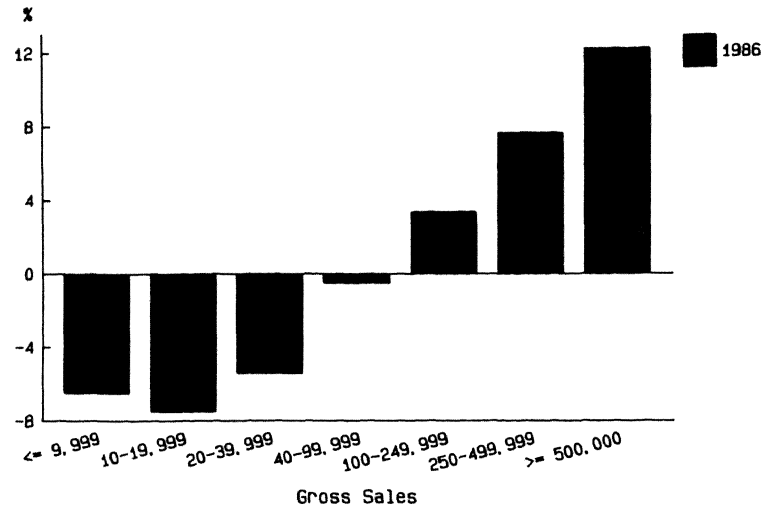
**Table 16: Measures of Ohio Farm Household Financial Condition, December 31, 1986**

| Item | All Farms | Commercial Farms (Sales over $100,000) |
|---|---|---|
| Assets ($1000's per farm) | 326 | 646 |
| Debt ($1000's per farm) | 59 | 184 |
| Equity ($1000's per farm) | 267 | 462 |
| Debt/Asset (%) | 18 | 28 |
| Share of farms in | | |
| financial stress (%)[1] | 18 | 35 |
| severe financial stress (%)[2] | 7 | 15 |
| Operating return on assets (%)[1] | −3.4 | +4.4 |
| Total return on assets (%) | −12.7 | −4.9 |

[1] Financial stress is defined as a debt-to-asset ratio greater than 0.4.
[2] Severe financial stress is defined as a debt-to-asset ratio greater than 0.7.

Source: Tables 9-11, 13-15, and survey data.

FIGURE 9: OPERATING RETURN ON ASSETS




Source: Computed from data in Tables 9-11 and 15-16.

before. But modern farming readily imposes technology-induced demands that exceed the financial capacity of one farm family. By the standards of tradition, equipment is complex and costly (Rogers) and has a capacity for more acres than one man owns, or can own right now if he invests in equipment instead. Much of modern farming is accomplished with land, equipment and money that each have different owners. What arangements the future will accommodate among these owners is being constantly assessed by each. Farming remains in a transition between tradition and technological promise that is far from over.

In 1969, the terms *venture* and *refuge* agriculture arose to characterize those who elected to continue in this transition and those who elected to withdraw (Rohrer and Douglas). Today there are many refuge farms, which produce little, and a small number of venture farms that produce much. In these circumstances, averages lose utility. Table 18 provides an example.

In this survey the average operation consisted of 336 acres, of which half was

**Table 17: Stress: Percent Positive Responses to Questions About 1986 Financial Management and Stress Among 503 Ohio Farm Operator Households, Mail Survey, 1987[1]**

| Financial Condition | | Coping With Expenses | | Stress and Attitude | |
|---|---|---|---|---|---|
| Question | Percent Yes | Question | Percent Yes | Question | Percent Yes |
| 1. Debt/asset ratio is over 40? | 15.2 | To meet expenses, have you:<br>1. Used savings? | 49.5 | 1. Your long term stress level has worsened greatly? | 15.8 |
| 2. Finances worse than 5 years ago? | 30.4 | 2. Postponed major farm purchases? | 65.4 | 2. Daily stress level is now severe? | 17.5 |
| 3. Finances worse than other farmers? | 13.0 | 3. Changed food consumption patterns? | 28.9 | 3. Farming another 5 years now seems unlikely? | 29.5 |
| 4. Are there problems now with your loans? | 10.9 | 4. Postponed medical care? | 17.7 | 4. Would you advise your children or relatives against farming? | 41.9 |

[1]Questions here are abbreviated (for space and format) from the way they were originally stated in the mail questionnaire sent to respondents, but their meaning and relationship to the response remain the same.

Source: Lobao mail survey, 503 respondents, autumn 1987.

owned. But we see that actual operations of about this size owned much more than half. We see that smaller acreages probably include nearly all the refuge farms, which own most of their land, and that venturesome commercial farms are fewer and larger, and sustained by rented land. The larger the farm and the larger the equipment investment (Table 9), the more land is rented (Table 18 and Figure 10). The operation is leveraged with borrowed land as well as with borrowed money.

### Cropland Slope

Ohio cropland can be characterized as mostly level to moderately rolling. Although there is an abundance of steeply sloping land in non-Corn Belt portions of the state, little of it is used as cropland. These characteristics are reflected in the percentage distribution of cropland slope among respondents in this survey (Table 19 and footnote).

### Output and Technical Efficiency

Technical efficiency appeared to rise as farm size increased, and productivity also tended to increase as farm size increased (Table 20 and footnote). Yield increases were most rapid for row crops and dairy, and less consistently related to size for wheat and hogs.

### Crop Rotations

Crop rotations used in Ohio farming show a combination of tradition and innovation among farm operators in their response to the needs and opportunities their cropland presents. Much of the cropland on the largest farms is in continuous crops (Table 21 and Figure 11).

Alternatives to continuous cropping or the customary rotations tend to be found among the smallest farms. This may reflect more a disinterest in opportunities than any motivating concern for conservation. Recall that these small farms and households are both supported by nonfarm income (Table 5).

### Tillage Practices

Continuous cropping is criticized for its perceived adverse effects in conserving soil. Continuous cropping is most common on the largest operations (Table 21). Two observations have merit here. Continuous cropping and the largest farms tend to coincide on the flattest land where sought-after advantages of size and specialization are most readily realized (Table 19), and these fields usually are the least susceptible to erosion. Further, conservation tillage practices also are most often found practiced by these large operators (Table 22). So where the occurrence of continuous cropping is greatest, so also is the occurrence of conservation tillage (Figures 11 and 12).

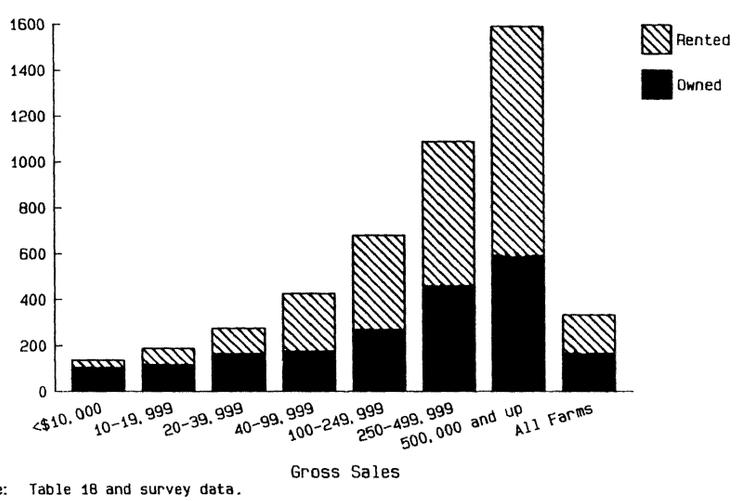
Notice that conventional moldboard plowing is most common among small farms and that conservation tillage practices are most commonly associated with large farms. It is interesting to note that there is widespread adoption of conservation tillage as the predominant tillage practice, especially by larger operators. While concern for conservation among large farmers could be

**Table 18: Average Acres Farmed per Operator Household, by Farm Size, 1986**

| Farm Size (Sales) | Owned | | Rented | | Total |
|---|---|---|---|---|---|
| | Acres | Percent | Acres | Percent | Acres |
| Under $10,000 | 105 | 76.1 | 33 | 23.9 | 138 |
| $10-19,999 | 118 | 62.4 | 71 | 37.6 | 189 |
| $20-39,999 | 166 | 59.9 | 111 | 40.1 | 277 |
| $40-99,999 | 177 | 41.1 | 250 | 58.9 | 427 |
| $100-249,999 | 271 | 39.7 | 411 | 60.3 | 682 |
| $250-499,999 | 461 | 42.3 | 630 | 57.7 | 1,091 |
| $500,000 + | 594 | 37.3 | 1000 | 62.7 | 1,594 |
| All Farms | 167 | 49.7 | 169 | 50.3 | 336 |

Source: Survey data.

**FIGURE 10: ACRES OPERATED**




Source: Table 18 and survey data.

**Table 19: Cropland Slope: Percentage Distribution of Cropland Slope Among Respondents, by Farm Size, 1986[1]**

| Farm Size | Level Under 2.0% | Moderate 2.0—5.9% | Steep 6.0% and up |
|---|---|---|---|
| Under $10,000 | 34 | 58 | 8 |
| $10—19,999 | 42 | 55 | 3 |
| $20—39,999 | 49 | 49 | 2 |
| $40—99,999 | 41 | 56 | 3 |
| $100—249,999 | 46 | 49 | 5 |
| $250—499,999 | 42 | 56 | 2 |
| $500,000+ | 45 | 52 | 3 |
| All Farms | 41 | 54 | 5 |

[1] Slope is defined by the Soil Conservation Service (USDA) generally by the percentages shown here. These percentages may vary slightly from county to county due to varying performance characteristics of different soil types. "Steep" (6%) is easily imagined by a football field 18 feet higher at one goal than the other, or by a quarter-mile field at least 80 feet higher at one end than at the other.

Source: Survey data.

**Table 20: Productivity: Selected Crop and Livestock Yields per Operator Household, by Farm Size, 1986**

| Farm Size | Crops Corn (bushels per acre) | Crops Beans (bushels per acre) | Crops Wheat (bushels per acre) | Livestock Milk (lb) per Cow | Livestock Pigs Per Litter | Productivity Index[1] |
|---|---|---|---|---|---|---|
| Under $10,000 | 107 | 38.5 | 43.7 | 13,275 | 8.5 | 97 |
| $10-19,999 | 116 | 38.4 | 44.1 | 11,833 | 7.3 | 94 |
| $20-39,999 | 120 | 39.4 | 46.3 | 13,533 | 7.9 | 100 |
| $40-99,999 | 132 | 41.1 | 49.4 | 14,785 | 8.3 | 107 |
| $100-249,999 | 135 | 43.0 | 48.8 | 16,100 | 8.2 | 110 |
| $250-499,999 | 128 | 42.4 | 46.0 | 16,478 | 8.2 | 108 |
| $500,000+ | 136 | 42.7 | 49.5 | 17,239 | 8.1 | 112 |
| State Average[2] | 122 | 41.0 | 46.0 | 12,888 | 7.9 | 100 |

[1] Individual yields are divided by the state average, generating an index for each column. These are weighted by percent of farm receipts contributed by each column and then averaged, producing the index in the last column.
[2] Computed by The Ohio Agricultural Statistics Service.

Source: Ohio Agricultural Statistics and survey data.

inferred by these trends, it is also possible that savings in time and horsepower (some of it induced by high fuel prices in recent years) both are strongly motivating factors in the adoption of alternatives to the moldboard plow.

### Conservation Practices

A planned intent to employ conservation practices is directly associated with farm size. The larger the farm, the more likely it is to be employing two or more conservation practices in addition to the tillage or rotation practices used on the farm (Table 23). It appears probable that public attitudes and policy incentives in the future will heighten the emphasis on resource conservation with a result that Ohio farming will continue to develop the trends that appear in Tables 22 and 23.

## MANAGEMENT PRACTICES

### Marketing Methods

Most Ohio farm operators sell soybeans and wheat at harvest. Government CCC storage is common for corn. Most storage for later sale is private, and nearly 20 percent of the 1986 soybean harvest was sold in this way. The most important reason for storage, however, is for corn and hay to be used as feed on the farm (Table 24, Figure 13).

Livestock also are sold at the prevailing price when they reach market weights. Livestock auctions are a popular market outlet in Ohio, but noticeably more so for fed cattle than for slaughter hogs (Table 25). Local concentration yards, by contrast, tend to be a much more common outlet for hogs than for fed cattle. Sales direct to the packer have become increasingly popular over the years, perhaps even more than indicated by Table 25, since packers reported to the USDA that more than half of their 1986 Ohio purchases of cattle (as well as hogs) came to them direct or through local concentration yards (USDA).

For both livestock and crops, it is apparent that marketing is a straightforward, rather simple process for most Ohio farmers, selling for cash at one of the closest elevators, packers or livestock markets as

soon as the product is ready for sale (Tables 24, 26, Figure 14).

Operators of larger farms tend to buy their inputs from and sell products to more distant sources (Table 26). Average distance traveled to markets is more than twice as far for larger farms as smaller ones. Others have documented that larger farms pay lower prices per delivered unit as a result (Zulauf and King).

### Marketing Tools

Moving away from the convenience and simplicity of harvest sale and toward a planned marketing strategy is strongly related to farm size (Table 27, Figure 15). Among large farm operators, there is a clear, planned effort to prepare for the moment of sale and, by that preparation, to assert some control over price and the terms of sale. Forward pricing, the most commonly-used tool, is an agreement in advance with a local merchant about the price to be paid at the time of delivery in the future. Hedging will accomplish the same purpose but is less widely used. While it may be more rewarding than forward pricing, it is regarded by many as being much less convenient (for a variety of reasons) than dealing with a well-known market operator nearby.

### Management Services

The use of professional management services has become increasingly widespread in commercial agriculture, beginning probably with tax assistance in earlier years, and spreading from the local bookkeepers and attorneys who initiated these services to a broader range of services like those summarized in Table 28. Their use is directly related to size, the largest firms typically being the first adopters. Accounting and bookkeeping were widespread by 1986, used by nearly half of Ohio farm operators. Other services (Table 28) may reasonably be expected to follow that trend.

Differences between commercial farm operators and other operators are very noticeable in their purchase of management services. Accountants, attorneys, consultants and computer services are purchased

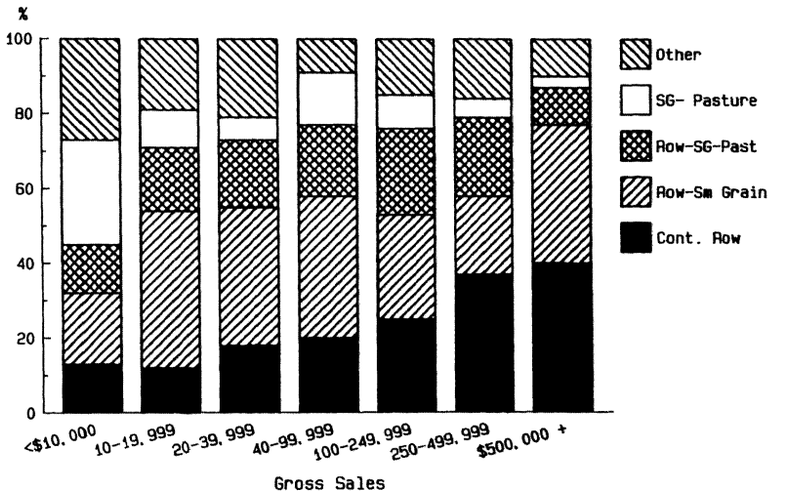
**Table 21: Percentage Distribution of Crop Rotations Used by Ohio Farm Operators, by Size, 1986**

| Farm Size | Continuous Row Crops | Row Crops/ Small Grains | Row Crops/ Small Grains/ Pasture[1] | Small Grains/ Pasture[1] | Other[2] |
|---|---|---|---|---|---|
| Under $10,000 | 13 | 19 | 13 | 28 | 27 |
| $10—19,999 | 12 | 42 | 17 | 10 | 19 |
| $20—39,999 | 18 | 37 | 18 | 6 | 21 |
| $40—99,999 | 20 | 38 | 19 | 14 | 9 |
| $100—249,999 | 25 | 28 | 23 | 9 | 15 |
| $250—499,999 | 37 | 21 | 21 | 5 | 16 |
| $500,000+ | 40 | 37 | 10 | 3 | 10 |
| All Farms | 17 | 31 | 17 | 16 | 19 |

[1] "Pasture" includes harvested forage such as hay and silage.
[2] For example, continuous pasture, idle, nursery crops, and specialty crops like tomatoes or sugar beets.

Source: Survey data.

**FIGURE 11: CROP ROTATIONS BY SALES**




Source: Table 21.

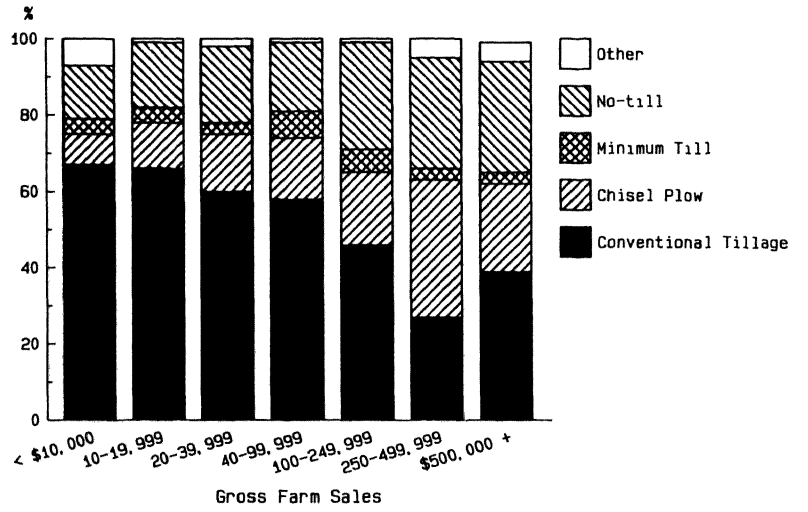
**Table 22: Percentage Distribution of Predominant Tillage Practices Used by Ohio Farm Operators, by Size, 1986**

| Farm Size | Conventional Tillage[1] | Conservation Tillage: Chisel Plow | Conservation Tillage: Minimum Till[2] | Conservation Tillage: No Till | Other |
|---|---|---|---|---|---|
| Under $10,000 | 67 | 8 | 4 | 14 | 7 |
| $10—19,999 | 66 | 12 | 4 | 17 | 1 |
| $20—39,999 | 60 | 15 | 3 | 20 | 2 |
| $40—99,999 | 58 | 16 | 7 | 18 | 1 |
| $100—249,999 | 46 | 19 | 6 | 28 | 1 |
| $250—499,999 | 27 | 36 | 3 | 29 | 5 |
| $500,000+ | 39 | 23 | 3 | 29 | 5 |
| All Farms | 59 | 14 | 5 | 19 | 3 |

[1] Includes moldboard plowing systems (plowing and disking) as well as other tillage systems that leave less than a 30 percent ground cover.
[2] Minimum till includes all conservation tillage systems other than those using chisel plowing or no tillage.

Source: Survey data.

**FIGURE 12: TILLAGE PRACTICES BY SALES**




Source: Table 22.

regularly by the largest farms and infrequently by the smallest. This propensity to purchase services from off-farm experts may further explain the cost advantages of larger farm operators.

### Community Participation

An important managerial component is the relationship between managers and others in their community of interests. It is generally true that the most active and innovative management is a consequence of an active search for and assimilation of diverse ideas from many sources. Community participation and memberships in various organizations have been found to be directly related to this managerial process (Rogers). In this survey, membership in civic organizations was not found to be related to farm size, but membership in farm organizations was directly related to size, individual participation being found more frequently as farming operations increased in size (Table 29).

## A SUMMARY SKETCH OF OHIO FARM OPERATOR HOUSEHOLDS

The Constitution-driven object of the Bureau of the Census is to enumerate, to take a total count. The definition for "farm" that is used by the Census is intended to be all-inclusive. That definition includes any production unit that in a normal year would generate product sales of $1,000 or more. By this definition, there were 79,277 farms in Ohio in 1987.

This publication summarizes results of a telephone survey conducted with a representative sample of Ohio farm operator households drawn from the census population. The survey was conducted in Winter 1987 and inquired about the farm enterprise and farm and nonfarm income and expenses for the household during 1986. Financial stress in agriculture in the 1980's was a focal point of the survey. Responses from 940 farm operator households are the basis for the results reported here. Statistical tests confirm that these results can be applied accurately to

the entire 1987 farm operator population in Ohio.

Perhaps the most striking thing about these households is the diversity in farms that arises from the Census definition. Farms that generated gross sales under $40,000 in 1986 (and most of these sold under $10,000) accounted for 63 percent of all farms but produced only 16 percent of Ohio farm output. On the average, these households depended entirely on nonfarm income; it supported not only the household but also the farm, which lost money in 1986. Farm operator households that generated more than $100,000 per year in farm product sales were only 17 percent of the total but accounted for more than 60 percent of the output. Farms between these extremes, selling $40,000-100,000 annually and accounting for 20 percent of all operations and 23 percent of sales, typically were part-time operations with households supported primarily by nonfarm income.

Despite financial adversity in 1986, commercial farm operations seemed managerially sound. Yields of corn, beans and wheat rose as farm size increased, as did the productivity index for total farm output. The occurrence of conservation tillage and conservation practices such as terracing, strip cropping, cover crops and grass waterways, all rose as farm size increased. While the average farm typically sold crops for cash at harvest, most of the contracting, forward pricing and hedging was done by the larger operators. Distance to market for the sale of crops and livestock or the purchase of inputs also rose as farm size increased. The percentage of farms that employed the services of bookkeepers and accountants, attorneys, consultants and computers, also was positively associated with farm size. Membership in farm organizations became more common as farm size rose, as did positions of leadership in those organizations and in the community.

The group that accounted for most of the households but little of the output had not, on the average, been much affected by the financial stress in agriculture that has been widespread in the 1980's, primarily

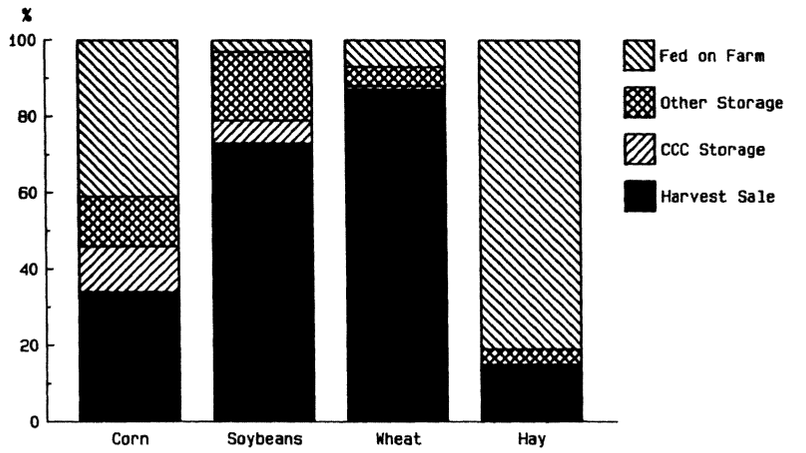
**Table 23: Percentage Distribution of Conservation Practices Used by Ohio Farm Operators, by Size, 1986[1]**

| Farm Size | Conservation Practices | | | |
|---|---|---|---|---|
| | None | One | Two | Three or More |
| Under $10,000 | 32 | 25 | 17 | 26 |
| $10—19,999 | 25 | 21 | 26 | 28 |
| $20—39,999 | 13 | 34 | 28 | 25 |
| $40—99,999 | 12 | 21 | 31 | 36 |
| $100—249,999 | 10 | 17 | 27 | 46 |
| $250—499,999 | 5 | 6 | 32 | 57 |
| $500,000+ | 9 | 19 | 35 | 37 |
| All Farms | 20 | 23 | 25 | 32 |

[1] Although rotations or tillage methods may have been counted again here by some respondents, the intent of the question is to inquire about practices such as contour plowing, terracing, strip cropping, cover crops, grass waterways and diversions, rather than conservation tillage.

Source: Survey data.

**FIGURE 13: MARKETING GRAIN AND HAY**




Source: Table 24.

**Table 24: Percentage Distribution of Disposition of Major Crops Harvested by Ohio Farm Operators, 1986**

| Crop | Harvest Sale | Storage for Sale | | Fed on Farm |
|---|---|---|---|---|
| | | CCC | Other | |
| Corn | 34 | 12 | 13 | 41 |
| Soybeans | 73 | 6 | 18 | 3 |
| Wheat | 87 | 1 | 5 | 7 |
| Hay | 15 | 0 | 4 | 81 |

Source: Survey data.

because their farm indebtedness was low and because household support was usually based on nonfarm income. But those which accounted for most of the output and characterized commercial Ohio agriculture had been severely affected by financial adversity. In 1986, the value of farm land and buildings in Ohio fell by 9.3 percent. Despite a positive operating return on larger farms that were effectively managed in 1986, falling land prices produced a negative total return on assets that contributed further financial impairment.

A debt burden greater than 40 percent of assets was reported by 15 percent of *all* respondents (35 percent among operators with annual sales over $100,000); 30 percent of all 940 felt worse off financially than they were five years before; 11 percent reported loan problems with their lenders. Coping with finances involved the use of savings for half of them, altered food consumption patterns for nearly 30 percent, and postponed medical care for one in six. Nearly 30 percent doubted they would be in farming five years hence, and more than 40 percent were unwilling to recommend farming to children of relatives as an occupational choice.

## A CONTINUING STUDY

This publication has reported results from the first year of a longitudinal analysis that is designated to cover multiple years of observation. Comparable data to that reported here have been collected about the activities of 891 Ohio farm operator households for 1987, and 920 for 1988. Some results for those years have been published periodically in brief reports, but no substantial analysis comparing households over time has yet been made. Such comparisons are planned for forthcoming publications that would be similar to this one. ■

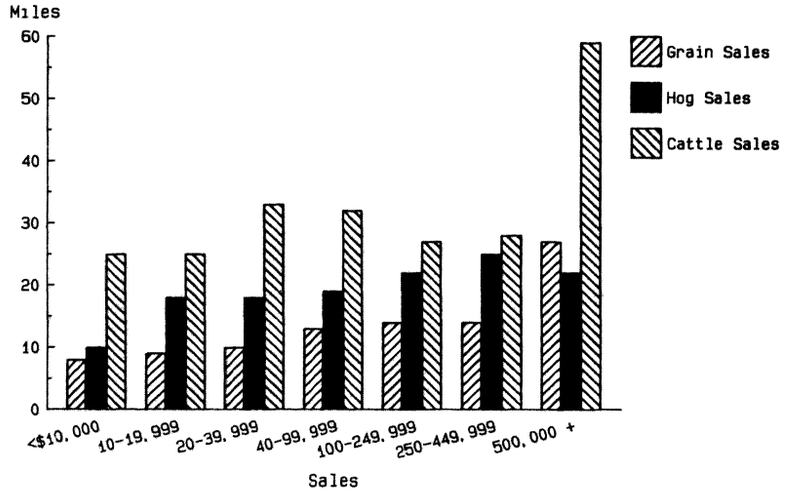
**Table 25: Percentage Distribution of Market Outlets for Cattle and Hog Sales, by Ohio Farm Operators, 1986[1]**

| Market Outlet | Fed Cattle | Slaughter Hogs |
|---|---|---|
| Direct-to-packer | 22 | 30 |
| Local Markets | 5 | 18 |
| Auctions | 53 | 38 |
| Other | 20 | 14 |

[1] These responses differ significantly from 1986 Ohio purchases reported by meat packers to the Packers and Stockyards Division, USDA.

Source: Survey data.

**FIGURE 14: AVERAGE DISTANCE TO MARKETS**




Source: Table 26

**Table 26: Average Miles to Market for Major Purchases and Sales by Ohio Farm Operators, by Farm Size, 1986**

| Farm Size | Average Miles to Market for: Grain Sales | Cattle Sales | Hog Sales | Purchased Inputs[1] |
|---|---|---|---|---|
| Under $10,000 | 8 | 25 | 10 | 10 |
| $10-19,999 | 9 | 25 | 18 | 9 |
| $20-39,999 | 10 | 33 | 18 | 10 |
| $40-99,999 | 13 | 32 | 19 | 13 |
| $100-249,999 | 14 | 27 | 22 | 14 |
| $250-449,999 | 14 | 28 | 25 | 24 |
| $500,000+ | 27 | 59 | 22 | 21 |
| All Farms | 11 | 28 | 16 | 11 |

[1] Includes feed, seed, fertilizer, chemicals, etc., but not depreciable inputs like machinery, buildings, fence, etc.

Source: Survey data.

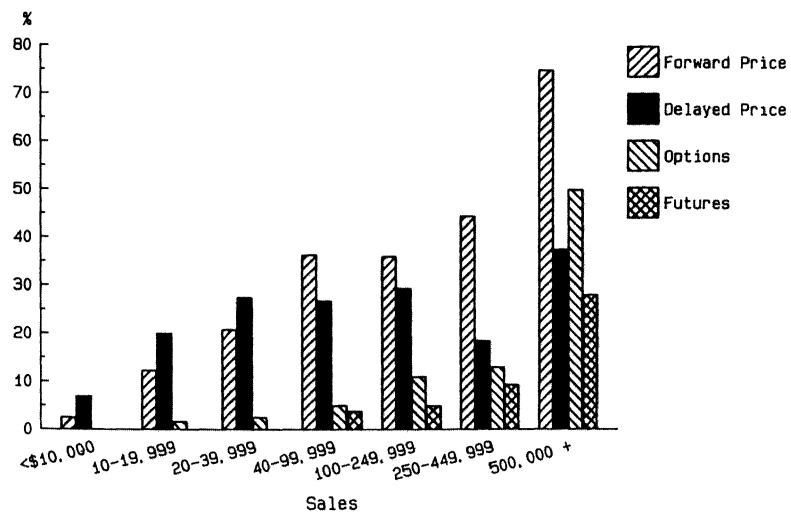
**Table 27: Percent of Ohio Farm Operators Using Selected Grain Marketing Tools, by Farm Size, 1986**

| Farm Size | Marketing Tools | | | |
|---|---|---|---|---|
| | Forward Pricing[1] | Delayed Pricing[2] | Hedging[3] | Options[4] |
| Under $10,000 | 2.5 | 6.9 | 0.0 | 0.0 |
| $10-19,999 | 12.3 | 20.0 | 1.6 | 0.0 |
| $20-39,999 | 20.8 | 27.5 | 2.5 | 0.0 |
| $40-99,999 | 36.3 | 26.8 | 5.0 | 3.8 |
| $100-249,999 | 36.0 | 29.3 | 11.0 | 4.9 |
| $250-499,999 | 44.4 | 18.5 | 13.0 | 9.3 |
| $500,000+ | 75.0 | 37.5 | 50.0 | 28.1 |
| All Farms | 19.9 | 19.5 | 3.8 | 1.8 |

[1] Price agreed upon before delivery to a local merchant middleman.
[2] Agreement to price after delivery at the option of the seller.
[3] Fixing a price by selling futures contracts on a commodity market.
[4] A method of pricing by placing "put" and "call" orders on a commodity market.

Source: Survey data.

**FIGURE 15: FARMS USING MARKETING TOOLS**




Source: Table 27.

# REFERENCES


Abeles, R.P. (sponsor representative) "Annotated Bibliographies for Longitudinal and Cohort Research," Behavioral Sciences Research, National Institute on Aging, Bldg. 31C, Room 4C32, Bethesda, MD 20892, August 12, 1986.

Armstrong D.L., E.T. Shaudys. "Profitability of Practices Affecting the Calf Crop of Beef Herds." Res. Cir. 103 Ohio Agri. Res. and Dev. Cen., Wooster, 1961.

Bonnen, James T. "The Dilemma of Agricultural Economists: Discussion." *American Journal of Agricultural Economics* 65(1983), 889-890.

Bryant, W. Keith. "Rural Economic and Social Statistics" in *Survey of Agricultural Economics Literature*, Vol. 2, University of Minnesota Press, 1977.

Coleman, J.S. "The Mathematical Study of Change" in *Methodology in Social Research*, H.M. Blalock and A.B. Blalock, Eds., McGraw-Hill, New York, 1968.

Gardner, Bruce. "Fact and Fiction in the Public Data Budget Crunch." *American Journal of Agricultural Economics* 65(1983), 882-888.

Goldstein, H. *The Design and Analysis of Longitudinal Studies: Their Role in the Measurement of Change*, Academic Press, London, 1979.

Governor's Commission on Agriculture. "Agriculture: Ohio's Economic Heartbeat." Office of the Governor. Columbus, 1984.

Irwin, S.H., D.L. Forster, and B.J. Sherrick. "Returns to Farm Real Estate Revisited." *American Journal of Agricultural Economics* 70(1988):580-587.

Just, Richard E. "The Impact of Less Data on the Agricultural Economy and Society." *American Journal of Agricultural Economics* 65(1983): 872-881.

Kessler, R.C. and Greenberg, D.F. *Linear Panel Analysis: Models of Quantitative Change*, Academic Press, New York, 1981.

Kohls, R.L. and J.N. Uhl. *Marketing of Agricultural Products* (6th Edition), Macmillan, New York, 1985.

**Table 28: Percent of Ohio Farm Operators Using Selected Professional Management Services, by Farm Size, 1986**

| Farm Size | Management Service | | | |
|---|---|---|---|---|
| | Bookkeepers and Accountants | Attorneys | Consultants[1] | Computers[2] |
| Under $10,000 | 37.1 | 14.1 | 4.7 | 3.1 |
| $10-19,999 | 39.5 | 21.0 | 5.7 | 3.2 |
| $20-39,999 | 49.2 | 24.6 | 7.4 | 8.2 |
| $40-99,999 | 51.7 | 20.1 | 12.9 | 9.0 |
| $100-249,999 | 57.8 | 25.3 | 23.5 | 13.3 |
| $250-499,999 | 74.1 | 48.2 | 35.2 | 18.9 |
| $500,000+ | 78.1 | 53.1 | 34.4 | 37.5 |
| All Farms | 46.5 | 20.7 | 10.5 | 7.1 |

[1] Includes professional expertise in marketing, finance, fertility, pest control, etc.
[2] Ranging from home computers and various program packages to computer services beyond accounting.

Source: Survey data.

**REFERENCES** (Continued)

Rogers, E.M., *Diffusion of Innovations*, The Free Press, New York, 1962.

Rohrer, W.C., L.H. Douglas, *The Agrarian Transition in America: Dualism and Change*, Bobbs-Merrill, New York, 1969.

Schertz, Lyle, et al. *Another Revolution in U.S. Farming*? U.S. Department of Agriculture, 1979.

U.S. Department of Agriculture, ERS, *Agricultural Resources: Land Values and Markets*, Situation and Outlook Report AR-6, July, 1987.

U.S. Department of Agriculture, *Economic Indicators of the Farm Sector*, National Financial Summary, 1986. ECIFS 6-2. December, 1987.

U.S. Department of Agriculture, Packers and Stockyards Administration, *Packers and Stockyards Statistical Report for 1987*, SR 1987-1, December, 1987.

Zulauf, C.R. and K. King. "Input Purchasing Advantages Associated with Farm Size." *Agribusiness: An International Journal* 1(1988): 44-52. ■

**Table 29: Memberships: Percent of Ohio Farm Operator Households with Memberships in Selected Organizations, by Farm Size, 1986**

| Farm Size | Type of Organization | | | | |
|---|---|---|---|---|---|
| | General Farm | Specific Commodity | Local Farm | Civic Association[1] | Boards and Directorships[2] |
| Under $10,000 | 48.1 | 12.8 | 11.8 | 19.9 | 8.2 |
| $10-19,999 | 60.5 | 15.3 | 24.6 | 22.6 | 13.7 |
| $20-39,999 | 64.8 | 20.5 | 20.5 | 19.0 | 14.8 |
| $40-99,999 | 70.0 | 31.1 | 30.3 | 19.0 | 21.7 |
| $100-249,999 | 80.1 | 48.5 | 38.0 | 23.6 | 31.3 |
| $250-499,999 | 85.2 | 51.9 | 38.9 | 24.1 | 42.6 |
| $500,000+ | 81.3 | 84.4 | 34.4 | 21.9 | 43.8 |
| All Farms | 62.7 | 24.5 | 23.3 | 20.6 | 17.1 |

[1] Rotary, Chamber of Commerce, fraternal organizations, for example.
[2] For example, ASCS, PCA, FLB, co-operative organizations, and bank trustees.

Source: Survey data.